

given on this chart as reported. The Chief Signal Officer takes this occasion to express his high appreciation of the valuable reports and diagrams furnished by Commander R. Brown of the "Allan" Royal Mail S. S. *Polynesian*. No. XII passed to the east off the coast on the 24th as a severe storm, the barometer at Sydney falling as low as 29.14 and that at Anacosti to 29.19. The following report taken under the direction of Commander Jules Ueberweg of the S. S. *Nederland* of the Red Star Line, indicates that this storm continued its easterly course over the Atlantic to 51° N., 22° W. This vessel was five days in passing from longitude 23° to longitude 30°. The following observations were taken on this vessel during the storm:

Date.	Wind.	Course.	Distance.	Lat.	Long.	Bar.	Temp.	Remarks.
Nov. 27th.....	WNW.	{ S. 86° 27' W.	{ 210 miles.	30° 57'	25° 52'	29.18	43°	Violent and terribly high sea.
Nov. 28th.....	NW.			30° 35'	21° 50'	29.57	42°	Violent and terribly high sea.
Nov. 29th.....	NW. to WSW.			30° 47'	24° 58'	29.18	45°	Stormy and boisterous: furious high sea.
Nov. 30th.....	WSW. to NW.			30° 43'	25° 40'	29.40	44°	Stormy and boisterous: furious high sea.
Dec. 1st.....	WNW.			30° 47'	28° 57'	29.40	45°	Wind and sea abating gradually

The following reports furnished through the co-operation of the New York Herald Weather Service, indicate the presence of this storm as it passed eastward over the ocean. S. S. *Wyoming*, 24th, 7 a. m., in 41° 26' N., 63° 46' W., 29.38, SW., force 7, high westerly sea, gloomy weather and rain; 3 p. m., in 41° 05' N., 65° 40' W., 29.42, WNW., force 6, overcast and rain. 25th, 7 a. m., in 40° 30' N., 69° 08' W., 30.08, WNW., force 7, partly cloudy weather. S. S. *Gallia*, 24th, 7 a. m. in 41° 52' N., 66° 17' W., 29.40, S., force 4, overcast and rain; noon, in 41° 45' N., 67° 40' W., 29.30, NW., force 4, cloudy weather and rain.

No. XIII.—Appeared in the Gulf of Mexico, south of the mouth of the Mississippi river, on the afternoon of the 22d. This storm became well defined, and passed northeast over Florida, causing high winds in the East Gulf. Signals were ordered for stations on the Atlantic coast as far north as Norfolk, but the depression either filled up or passed rapidly to the east off the South Atlantic coast, causing but slight disturbances at stations between Cape Hatteras and Jacksonville. The signals ordered for stations on the Gulf coast were justified; those ordered for Jacksonville, Savannah, Charleston and Wilmington were not justified at the stations. A vessel attempted to leave port at Jacksonville but was compelled to return.

No. XIV.—First observed in British America northwest of Ft. Garry on the 24th, and by the morning of the 25th it had moved southeastward to Lake Superior, causing high winds and snow in the Lake region. On the morning of the 26th the centre of disturbance was north of Lake Ontario, but generally fair weather continued in the districts on the Atlantic coast and south of the Lake region. This storm was followed by a slight depression, which developed into a severe storm in the St. Lawrence valley on the night of the 27th. The rapid advance of high area No. VII from the Hudson Bay region, caused a rapid increase in the barometric gradient to the west of the centre of this secondary storm, and high westerly winds were reported from Sydney, Yarmouth, and other stations in that region. The following reports furnished through the co-operation of the New York Herald Weather Service indicate the presence of this storm as it passed eastward over the ocean: S. S. *Italy*, 26th, in 47° 44' N., 38° 15' W., 29.10, heavy westerly gale, with squalls and very high sea. 27th, in 47° 09' N., 41° 03' W., heavy NNW. gales, slightly abating, with hail squalls and cloudy weather. S. S. *Republie*, (?) 26th, in 51° N., 24° 15' W., 28.56, WSW., force 11, terrific storm, violent squalls and high sea. 27th, in 50° 35' N., 26° 34' W., 29.31, WNW., force 10, terrific gale, violent squalls and high sea.

No. XV.—Advanced from the Upper Missouri valley on the afternoon of the 27th, but probably originated west of the Rocky Mountains. The centre of this storm passed far to the north of the Lake region, but the southern half of the depression included within its limits all districts north of Tennessee and Virginia. As the centre passed to the east the weather continued fair, except at extreme northern stations, with rising temperature and south to east winds.

No. XVI.—Developed in the Southwest on the 29th, and after passing over the Mississippi valley and Lake region as an area of rain and snow it was central north of Lake Erie at the close of the month. The temperature fell below freezing in the Rocky Mountain regions as far south as El Paso, as this storm moved to the east of the Mississippi. Cautionary off-shore signals were ordered on the 30th for Indianola and Galveston in anticipation of the light norther, which occurred in Texas on Dec. 1st.

INTERNATIONAL METEOROLOGY.

International charts Nos. IV and V accompany the present REVIEW. The former is published for September, 1879, and continues the series of this chart commenced in January, 1877. chart No. V is prepared for the month of December, 1879, and continues the series of this chart commenced in November, 1877.

Chart No. IV shows the mean pressure, temperature and the prevailing direction of the wind at 7.35 a. m., Washington or 0.43 p. m. Greenwich mean time, for the month of September, 1879, over the Northern and at certain isolated stations in the Southern Hemisphere. Two areas of mean barometric minima appear upon the chart for the present month, one (29.40) over Greenland and Iceland and the other (29.80) on the western coast of Africa in the vicinity of 8° N., 13° W. The former shows the lowest monthly mean pressure that has been recorded at Stykkisholm for the past three years. From the prevailing direction of the winds at Godthaab and Stykkisholm it would appear likely that a still lower mean pressure than that reported at Stykkisholm obtained in the vicinity of 70° N. During this month no less than seven storms, most of them displaying great energy, passed northeastward over the ocean between Greenland and the British Isles, entering Europe on the coast of Norway. The second area of low mean pressure presents even more unusual features of interest than does the first. As a rule the mean barometer along this portion of the western coast of Africa very rarely falls below 29.90 or 29.85, while at Free Town this month, the anomalous mean barometer of 29.75 is reported. At no time during the month did the daily reading at this station rise above 29.79 or fall below 29.67. The usual area of low mean pressure in Hindostan is for the present month, 29.70, although in northwestern Bengal and the Punjab the monthly mean is about 29.60. Elsewhere throughout the Northern Hemisphere the pressure is generally 30.00 or above. There are two principal areas of high mean pressure, 30.30 in the vicinity of the Azores and 30.20 in central Russia. Both of these areas embrace circumscribed regions; the former is a gradual increase of 0.06 to 0.10 inch over the mean of August, while the latter resulted from a decided increase of 0.25 to 0.40 inch over that month. The area of 30.10 over the Atlantic covers an immense region between the parallels of 20° and 50° N., and the meridians of 10° and 75° W., and as compared with the previous month of August is an enlargement of more than double its former proportions. The extreme mean pressures for the month are 29.38 (lowest) at Stykkisholm and 30.27 (highest) at Punta Delgado. The extreme monthly range of mean pressure is 0.89 inch, which is 0.33 inch larger than September, 1877, and 0.20 inch larger than September, 1878. The following extreme monthly mean temperatures are given in Fahrenheit's scale: *lowest*, Godthaab, 35° ; York Factory, 38° ; Stykkisholm, 43° ; Moose Factory and Nikolaievsk, on the Amoor, 47° ; Yeniseisk, 49° ; *highest*, Biskra, 92° ; Lahore, 90° ; Athens and Murcia, 83° ; Manilla, 82° . The prevailing direction of the winds over the United States, was *northeasterly* throughout the Atlantic states from southern Florida to New England; in the Gulf states, *northeast to southeast*; in the Lake region, *southwest to northwest*; in the Northwest and Upper Missouri valley, *northeasterly*; in the Lower Missouri valley and westward to the Rocky Mountains, *southerly*; in the Plateau and Pacific coast regions, *southwest to northwest*. Over Canada and the Maritime provinces, *southwest to northwest*. In central Mexico, *northeast to northwest*. Over the Atlantic ocean, *northeast to southeast* south of parallel 40° N., and to the northward of that parallel, *northeast to southwest and northwest*. In Europe, *southwesterly* over the British isles and Scandinavia and thence southeastward to the central portions of France and Germany, beyond which the winds over the remainder of Europe prevail from the *northeast, southeast and northwest*, modified by a strong tendency to *variable* in Spain and Italy. In Algeria the winds are *northeasterly*. In Hindostan, *westerly* along the western coast, elsewhere *variable*. Along the Asiatic coast and over the Japan islands, *northerly*. Compared with September, 1877 and 1878, the temperature over the United States is generally lower over the western portions, but susceptible of little change east of the 100th meridian. The pressure is decidedly higher between the 80th and 100th meridians; elsewhere little or no variation. Over the Atlantic, where comparison can only be made with 1878, the regions of highest pressure between the parallels of 20° and 50° N. show an increase of from 0.05 to 0.20 inch. Northward of 50° N. there appears a decrease pressure of from 0.05 to 0.30 inch. The temperature southward of 50° N. shows but little if any change, except in a narrow belt north of 45° N., where a fall of from 1° to 2° occurs. Northward of the 50th parallel the fall continues with greater positiveness. In the various countries of Europe the following changes appear: over the British isles the pressure is from 0.01 to 0.20 inch lower, while the temperature shows but little variation. In Scandinavia the pressure is generally higher, ranging from 0.01 to 0.25 inch; the temperature is from 3° to 6° higher. In Denmark the change in pressure is a plus quantity showing a variation of from 0.10 to 0.15 inch, while the temperature is from 5° to 10° higher. In France there is a general but comparatively slight rise in pressure and a small minus variation in temperature. In Germany and Austria there is a general rise in pressure of from 0.05 to 0.10 inch; the temperature in both countries shows a rise of from 2° to 6° . In Italy there is a rise in pressure of from 0.01 to 0.05 inch and of temperature from 1° to 4° . In Spain and Portugal there is a rise in pressure of from 0.01 to 0.05 inch and a general fall in temperature. In Russia the rise in pressure is more decided than in any other country of Europe, being an increase of from 0.15 to 0.35 inch; the temperature is everywhere higher, generally from 3° to 10° . In Hindostan the pressure is considerably higher along the western coast; elsewhere lower; the temperature is generally higher north of the Ganges, lower to the southward, and showing but little if any change along the western coast. In Algeria the pressure is generally higher, while the temperature shows a condition quite the reverse. The accompanying

table shows the deviations in temperature and barometer at isolated stations for the month of September, 1879, as compared with the means of the past two years:

Comparative Thermometric and Barometric Means, with corresponding Departures.

STATION.	Mean Temperature.			Mean Barometer.			STATION.	Mean Temperature.			Mean Barometer.		
	Sept., 1877-78.	Sept., 1878.	Departure.	Sept., 1877-78.	Sept., 1878.	Departure.		Sept., 1877-78.	Sept., 1878.	Departure.	Sept., 1877-78.	Sept., 1878.	Departure.
York Factory	36.1	37.5	+1.4	29.84	30.00	+0.25	Bridgetown	83.1	83.2	+0.1	29.92	29.93	+0.03
Godthaab	39.8	34.6	-5.2	29.73	29.69	-0.04	Navassa	83.4	82.5	-0.9	29.91	29.96	+0.05
Stykkisholm	45.6	43.2	-2.4	29.71	29.38	-0.33	Medellin	68.9	69.9	+1.0			
Tromso	46.5	50.8	+4.3	29.62	29.63	+0.01	San Jose de Costa Rica	67.8	68.0	+0.2			
Thorshavn	50.8	49.9	-0.9	29.81	29.55	-0.26	Mexico	55.4	54.7	-0.7	30.75	30.10	+0.02
Archangel	48.0	52.9	+4.9	29.69	30.01	+0.32	Melbourne	52.3	53.6	+1.3	30.04	30.01	-0.03
Ekaterinburg	52.2	52.3	+0.1	29.81	30.04	+0.23	Hobart Town	51.1	50.9	-0.2	29.85	29.90	+0.05
Barnaul	51.1	55.4	+4.3	29.88	29.90	+0.02	San Juan de Puerto Rico	81.0	81.9	+0.9	29.91	29.99	+0.08
Yeniseisk	51.0	48.9	-2.1	29.83	30.04	+0.21	Nassau	84.3	82.0	-2.3	29.65	30.02	+0.07
Nikolaiévsk, on the Amoor	50.9	46.9	-4.0				Havana	82.1	81.2	-0.9	29.93	29.97	+0.04
Zi-Ka-Wei	61.4	71.6	+10.2	29.94	29.91	-0.03	Astrakhan	70.9	69.3	-1.6	29.95	30.12	+0.17
Tokel	63.7	68.0	+4.3	29.90	29.92	+0.02	Athens	83.2	83.0	-0.2	29.93	29.98	+0.05
Pekin	69.0	66.7	-2.3	29.96	29.96	Norm'l	Lahore	82.2	80.8	-1.4	29.93	29.92	-0.01
Tashkend	66.6	67.5	+0.9	30.00	30.01	+0.01	Tiflis	77.3	74.5	-2.8	29.90	29.98	+0.08
Nukuss	70.7	72.9	+2.2	29.96	30.08	+0.12	Laghouat	83.7	85.3	+1.6	30.04	30.02	-0.02
Beirut	85.1	85.0	-0.1	29.85	29.85	Norm'l	Fort de France	81.5	80.1	-1.4	29.84	29.97	+0.13
Mauritius	75.6	72.5	-3.1	30.12	30.17	+0.05	Yokohama	89.8	69.9	-19.9	29.91	29.91	Norm'l
Fort Napier							Lisbon	73.8	69.1	-4.7	30.00	30.13	+0.13
Cape Town	61.6	64.7	+3.1	30.14	30.13	-0.01	Madrid	77.8	74.7	-3.1			
Free Town	82.1	80.8	-1.3	29.96	29.75	-0.21	Cagliari	79.1	79.4	+0.3	29.91	29.98	+0.07
Paramaribo	83.4	82.0	-1.4	30.07	30.08	+0.01	Gibraltar				29.97	30.08	+0.06
Funchal	76.2	74.7	-1.5	30.07	30.16	+0.09	Sandwich Manse	58.4	58.8	+0.4	29.87	29.75	-0.12
Ponta Delgado	73.3	74.2	+0.9	30.16	30.27	+0.11	Malta	83.6	81.4	-2.2	29.93	29.94	+0.01
Angra	69.9	71.1	+1.2	30.14	30.26	+0.12							

Chart No. V.—This chart displays the tracings of the probable courses of thirty-four of the principal storm areas of the Northern Hemisphere for the month of December, 1879. The approximate paths of progressive movement are based upon daily simultaneous international observations to the number of over 650, besides a large mass of irregular data which reaches this office in various ways from the logs of vessels of the merchant marine of the North Atlantic and North Pacific oceans. Concerning the general distribution of the paths of the areas of barometric minima the following is given: nineteen areas traversed portions of the United States, eight of which came from the Pacific ocean; eleven reached the Atlantic ocean, five of which crossed the same to the mainland of northern Europe. Two areas crossed British Columbia from the Pacific. One area first appeared over Hudson's bay and passed northeastward into northern Greenland. Another area developed over the Atlantic ocean near the Azores. One area first appeared in southwestern Europe, two in extreme northern Europe, one in southern Russia and one in western Siberia. Six areas formed over the seas bordering the Asiatic coast. Of the storms in North America the following descriptions are given: No. I.—This area formed in the Lower Missouri valley as the result of a general depression over the northern territories. Accompanied with snow and high northerly winds the storm passed northeastward to southern Michigan and thence, with increased rapidity, to the Canadian Maritime provinces, where the area became central on the morning of the 4th. During the day the depression passed off the coast of Newfoundland and on the following morning was central in about 50° N., 50° W. On this day the depression nearly disappeared under the influence of two high areas, 30.20 and 30.40, the former northeast of the Azores and the latter over New England. During the 6th as the latter rapidly advanced the former slowly receded, resulting finally in a division of the now, narrow and elongated depression, which reached from Iceland southwestward to about 40° N., 40° W. The southern arm of the depression passed southeastward to the Azores and thence eastward along the 40th parallel to the meridian of 20° W., when its course changed to northerly the depression disappearing near parallel 50° N. The lowest readings, reported during the progress of this subsidiary area occurred on the 9th at Angra and Ponta Delgado, 29.00 and 29.34 respectively, winds south. The northern arm passed northward to Iceland where on the 7th it became central off the western coast; Stykkisholm, 29.27, a fall of 0.39 inch in past 24 hours, wind SW., force 8, rain. 8th, depression central off the northwestern coast of Norway; Tromso, 29.32, a fall of 0.65 inch, SW., rain; Stykkisholm, 30.04, a rise of 0.77 inch, NE., force 6, snow. 9th, central over Lapland; Tromso, 28.92, a fall of 0.40 inch, SW., snow; Haparanda, 29.36, a fall of 0.37 inch, W., fair; Archangel, 29.08, a fall of 0.45 inch, drifting snow. 10th, central north of parallel 60° N., and between the meridians of 50° and 60° E.; Archangel, 29.22, a rise of 0.14 inch; during the day the depression remained about stationary, owing to the presence of a high area over southwestern Siberia, and on the 11th gradually filled up over the western portion of that country. No. II.—This area formed off the North Pacific coast region on the 1st and passed northeastward over British Columbia, affecting decidedly the pressure over the northern territories, from the influence of which area No. I resulted. The further course of area No. II. in the British Possessions could not be traced, owing to lack of reports. No. VI.—This area appearing off the North Pacific coast on the 2nd, soon followed the disappearance of area No. II. On the

3rd was central in southern Idaho, with rain or snow, quite general in the Middle Plateau region. During the day passed southeastward over Utah, and thence eastward into Colorado, where, on the 4th, it was central, the area 29.80, embracing the country from Washington territory eastward to Minnesota and southward to include Texas. 5th, depression central in the Lower Missouri valley, with greatly increased energy. During the day passed northeastward to the Upper Lake region, where it was central on the 6th with still greater energy; lowest barometer at Marquette 29.25, a fall of 0.63 inch, wind SE., snow. 7th, central over northern Canada in the vicinity of 50° N., 80° W.; Moose Factory, 29.34, a fall of 0.20 inch, wind shifted from S. to NW., with heavy snow. During the 7th and 8th, the course of the depression, as indicated upon the chart, is rather doubtful, owing to the lack of sufficient reports. It seems very probable, however, that the depression passed to the north of Godthaab, as shown by the following observations made at that station: 7th, 29.72, calm; 8th, 29.40, SSE., snow; 9th, 29.44, SW., cloudy; 10th, 29.91, calm, snow. During the 9th, depression disappeared under the influence of a high pressure area, 30.20, then prevailing off the west coast of Iceland. No. VIII.—This area formed off the North Pacific coast on the 6th and passed southeastward over Washington territory, and the Northern and Middle Plateau regions to Colorado, where it was central on the morning of the 7th. Snow, with high northwest winds, accompanied the depression in the Plateau regions. During the 7th the depression passed southeastward into Texas, where it dissipated by the following morning under the influence of a high pressure area from the Northwest which advanced rapidly southeastward. No. IX.—During the 7th the barometer fell quite rapidly over northern California with heavy rain and gales along the Middle Pacific coast, followed later in the northern portions of California and Nevada by heavy snow. 8th, central in the Middle Plateau region, Salt Lake barometer 0.66 inch below the normal. During the day the depression passed eastward to western Kansas and Nebraska preceded by fresh to brisk southeast to southwest winds with rain and snow eastward to Lake Erie. 10th, central over Lake Superior with greatly increased energy, lowest barometers at Duluth and Marquette, 29.16 and 29.17, respectively, winds southwest. During the day the depression advanced rapidly northeastward over Canada, being central on the morning of the 11th in about 50° N., 70° W., where the central area appeared to be inclosed by the isobar of 29.40. On this day and the following the depression passed eastward south of Greenland. The following observations taken at Godthaab, Greenland, show the influence of the depression during its approach and passage: 11th, 29.77, ENE.; 12th, 29.01, ENE.; 13th, 29.21, NNE.; 14th, 29.33, SW. The following observations were taken at Stykkisholm: 11th, 29.84, S., rain; 12th, 29.56, S., cloudy; 13th, 29.23, S., rain; 14th, 29.16, SW., snow; 15th, 29.34, SW., snow. On the 14th the depression was probably central in about 70° N., 5° E.; Tromsø, 28.96, a fall of 0.52 inch, SW., rain; Bronø, 29.40, SW., rain. 15th, central over Lapland; Tromsø, 28.87, W., snow; Haparanda, 29.28, W., clear; Archangel, 28.98, a fall of 0.72 inch, W., fair. 16th, central in about 60° N., 50° E.; Archangel, 29.24, WNW., drifting snow; Ekaterinburg, 29.10, a fall of 0.76 inch, WSW.; Kasan, 29.28, a fall of 0.54 inch, W. 17th, central in the valley of the Obi near 60° N., 70° W.; Ekaterinburg, 29.34, WNW.; Kasan, 29.71, NW.; to the eastward, in the provinces of Tomsk and Yeniseisk, the barometer fell slowly, winds shifting to easterly with snow. 18th, central with increased energy in the northern portion of the province of Tomsk; Barnaul, 29.80, a fall of 0.35 inch, SW., snow; Yeniseisk, 29.85, a fall of 0.16 inch, SSE. 19th, Yeniseisk, 29.71, S.; Barnaul, 29.91, SW., heavy snow. During the day the depression probably disappeared in a high pressure area 30.60, then prevailing over northern China. No. X.—This area formed over the Northern Plateau on the 9th, and by the following morning became central in eastern Utah, inclosed by the isobar of 29.80. During the 10th the depression lost its identity over southern Colorado, under the influence of a high pressure area 30.40, which passed rapidly southeastward from Manitoba in rear of area No. IX. No. XI.—Following the passage eastward of the previously mentioned high area, this depression formed in the Saskatchewan valley on the 12th, and passed southeastward into Wyoming, where it became central on the following morning. During the day the depression passed southward into western Kansas disappearing on the 14th over northern Texas. High westerly winds and snow were reported from central Colorado on the 13th; Pike's Peak, NW., 56 miles. No. XII.—This area formed over the western portion of the Gulf of Mexico on the 13th, accompanied by northerly gales and rain along the Texas coast. 14th, depression central in the vicinity of New Orleans, with no decided fall in the barometer at coast stations. From Mississippi northward to the Lakes and northeastward to New England, northeasterly winds with rain or threatening weather prevailed. During this day the depression passed rapidly northeastward over the Southern States, and by the morning of the 15th, was central in the Lower St. Lawrence valley, inclosed by the isobar of 29.60. Light rain or snow, with northeast to southeast winds, prevailed in New England and the Canadian Maritime provinces, followed on the 16th by winds changing to west and northwest, with clearing weather but falling barometer, as the central depression passed eastward to the Gulf of St. Lawrence. During the day depression passed eastward over Newfoundland, followed by winds shifting to southwest and northwest, with rapidly rising barometer. 17th, depression central in about 50° N., 45° W.; in 44° 53' N., 51° 04' W., WSW. to WNW.; fresh to strong gales, hard squalls, high sea; in 43° 12' N., 57° 39' W., strong NW. gales, hard

squalls, heavy sea; in $43^{\circ} 46' N.$, $54^{\circ} 22' W.$, W. strong, heavy hail squalls, high sea; in $53^{\circ} 40' N.$, $29^{\circ} 50' W.$, barometer 29.43, wind S., force 6, cloudy. 18th, depression about stationary; in $49^{\circ} 06' N.$, $31^{\circ} 54' W.$, westerly gales, stormy, high sea; in $48^{\circ} 07' N.$, $34^{\circ} 44' W.$, W. to N., moderate gale, heavy head sea; in $48^{\circ} 21' N.$, $39^{\circ} 08' W.$, moderate gale, heavy head sea. On the following day the depression moved very slowly northward combining on the 22nd with area No. XX then central southwest of Iceland. On the 21st a trough of low pressure extended from Iceland southwestward to Newfoundland embracing the supposed centres of areas No. XII and No. XX. No. XIV.—This area developed on the North Carolina coast as a subsidiary depression during the passage northeastward of area No. XII on the 14th. During the day it passed northeastward along the Middle Atlantic and New England coasts accompanied by northeasterly gales and rain and on the 15th became central off the southern coast of Maine, lowest barometer at Eastport, 29.52, a fall of 1.19 inches in past 24 hours. On this day the two areas, Nos. XII and XIV, moved in parallel courses northeastward, the former being central in the Lower St. Lawrence valley. On the 16th the two areas combined in the Gulf of St. Lawrence followed over New England and in the western portion of the Canadian Maritime provinces with clear or partly cloudy weather and occasional snow. In the eastern portion of the latter region, stormy weather still prevailed; lowest barometer at St. John's and St. Pierre, Newfoundland, 29.14 and 29.12, respectively, winds W.; Sydney, N. S., 29.26, SW. Severe southwest to northwest gales with heavy sea were experienced over the ocean north of parallel $40^{\circ} N.$ and between the meridians of 50° and $70^{\circ} W.$ No. XVI.—Following the passage southeastward of an area of 30.40 from the Saskatchewan valley; the barometer on the 15th fell quite suddenly over the northern Rocky Mountain region accompanied by southeast to southwest winds, light rain and snow. During the day this depression passed southeastward into Nebraska, where it was central on the morning of the 16th. On this day heavy westerly winds with snow were experienced in the central Rocky Mountain region: Pike's Peak, W. 62 miles; Cheyenne, W. 50 and Virginia City, W., 32. During the day the depression passed eastward with great rapidity, but diminishing energy, over the Lake region to New England, being central in the latter district on the morning of the 17th. By the following morning the central area passed off the Nova Scotia coast, losing its identity in an extensive area of 29.80 prevailing over the ocean from Greenland southward to parallel $40^{\circ} N.$ and thence southeastward to near the Cape Verde Islands. No. XVIII.—This area developed on the 17th over the Middle Plateau, forming an irregular elongated area of about 29.90, running from northern Montana southward to northern Arizona and thence southeastward down the valley of the Rio Grande. By morning of the 18th this large and irregular depression was considerably contracted by the descent southward of a high pressure area, 30.30, which cut off its eastern extremity and confined the central area to the region of its incipient stages. The area was now inclosed by the isobar of 29.80 and accompanied by northerly winds and snow on its northern border. During the 18th the depression lost its identity owing to the rapid advance of area No. XIX moving eastward from the Middle Pacific coast. No. XIX.—On the 18th while area No. XVIII, covered the Middle Plateau the pressure began to diminish along the California coast so that by the following morning an area of 29.60 (lowest barometer at Sacramento, 29.58, a fall of 0.40 inch) embraced the northern portion of the state. An elongated area of 29.80 extended from the Middle Pacific coast eastward to the Lower Missouri valley. On the 20th the depression was central in the Middle Plateau, lowest barometer at Winnemucca, 29.50, S., light rain. 21st, central in Wyoming, lowest barometer at Cheyenne, 29.45, a fall of 0.17 inch. On this day the area of 29.80 extended from British Columbia southeastward to Texas. 22d, central with diminished energy over Lake Huron. The area of precipitation covered the entire Lake region and thence eastward to the Atlantic. During the day this depression rapidly dissipated over Canada, under the influence of two areas of high pressure, 30.60 covering the western portion of the Canadian Maritime provinces and 30.30 in the Lower Missouri valley. No. XX.—This depression appeared on the 19th in the southern portion of the Upper Lake region and moved rapidly northeastward over the Lower Lakes, accompanied by rain or snow and fresh to brisk southwesterly winds. During the 20th passed southward off the Nova Scotia coast, and then again to the northeast, being central on the 21st with greatly increased energy in the vicinity of $50^{\circ} N.$, $50^{\circ} W.$ 21st, in $48^{\circ} 50' N.$, $46^{\circ} 40' W.$, 29.36, SW., force 6, heavy sea, threatening; in $46^{\circ} 58' N.$, $45^{\circ} 55' W.$, heavy westerly gales, with violent squalls; in $45^{\circ} 21' N.$, $44^{\circ} 30' W.$, strong SW. to W. gales, high sea; in $49^{\circ} 29' N.$, $35^{\circ} 32' W.$, W. and SW. strong gales, squally, heavy head sea; in $49^{\circ} 33' N.$, $32^{\circ} 36' W.$, NW. strong, snow and hail squalls, high W. sea; in $51^{\circ} 08' N.$, $48^{\circ} 30' W.$ NE. to NW. moderate gale. During the 21st depression passed rapidly northeastward, being central on the 22d in about $60^{\circ} N.$, $30^{\circ} W.$ Although the central area of low on this day was situated far to the north, yet the influence of the depression was still evident southward to parallel $45^{\circ} N.$, as shown by the following reports, where the violence exhibited is largely due to the advance eastward of an area of 30.60 over the Gulf of St. Lawrence. In $45^{\circ} 30' N.$, $50^{\circ} 18' W.$, WNW. heavy gale, dense snow squalls; in $48^{\circ} 34' N.$, $37^{\circ} 33' W.$, rain and hail, with high westerly winds; in $48^{\circ} 29' N.$, $39^{\circ} 43' W.$, NW. and W. hard gale, very heavy head sea; in $44^{\circ} N.$, $47^{\circ} 49' W.$, strong W. and SW. gales, with very high sea. During the approach and passage of the storm the following observations were

made at Stykkisholm, Iceland: 20th, 29.60, S.; 21st, 29.15, E.; 22d, 29.39, E.; 23d, 28.85, SE., rain and hail; 24th, 29.50, NE., cloudy. After rounding Iceland to the northward, the depression was central on the 24th over the ocean northwest of Norway; Tromsø, 29.04, SW., cloudy; Bronø, 29.27, SW., rain; Thorshavn, 29.35, W., force 6. 25th, depression central east of the White sea; Archangel, 28.85, a fall of 0.18 inch, NW., snow; over central Russia the winds shifted to southwest with rapidly falling pressure and snow. 26th, central in eastern Russia; Kasan, 29.31, SW., cloudy; Ekaterinburg, 29.45, WSW., cloudy. 27th, central northeast of the Caspian sea; over central and eastern Russia winds shifted to north and northeast with rising barometer and snow; lowest barometer at Astrakhan, 29.79, a fall of 0.12 inch, NE., cloudy. During the day depression disappeared in a high pressure area prevailing over Toorkistan. No. XXI.—This depression first appeared to the northwest of Hudson's bay on the 18th, when the barometer at York Factory fell from 30.17 to 29.99, and the wind shifted from east to southeast. 19th, depression central north of York Factory, barometer 29.50, S., snow; 20th, 29.67, SW., clearing. It is rather difficult to trace the course of the depression after the 19th, owing to the entire absence of reports over that portion of North America north of parallel 60° N. But the influence exerted upon the surrounding pressure at Godthaab, Greenland, appears to be of such a nature and degree that it would seem a safe judgment to trace the area as indicated upon the chart. The following observations were made at Godthaab: 18th, 29.34, ENE.; 19th, 29.22, ENE.; 20th, 29.09, calm; 21st, 29.1°, SE.; 22d, 29.30, ENE.; 23d, 29.75, NW. On the 23d this depression combined with area No. XX, then central off the western coast of Iceland. No. XXIV.—While area No. XIX was central in Wyoming and before a complete recovery of pressure took place over the Middle Plateau, the barometer began again to fall and by the morning of the 22d an area of 29.60 was central in Utah. During the day the depression moved southeastward into Arizona; the area of 29.80 extended from Montana southward to Mexico and thence eastward along parallel 30° N. to central Texas. Owing to the rapid descent of a high pressure area 30.80, from the British possessions the depression disappeared in northern New Mexico during the 23d. No. XXV.—This depression of slight energy appeared off the Middle Atlantic coast on the 22d forming as a subsidiary area to No. XIX then central in the Upper Lake region. During the day it moved rapidly northeastward along the coast accompanied by northeasterly gales and rain. 23d, central south of Newfoundland; lowest barometer at St. Pierre, N. F., 29.83, wind, S., force 5, stormy; in 44° 05' N., 55° 40' W., 29.98, SSE., force 6, rain. During the day disappeared in a high pressure area, 30.40, prevailing near 40° N., 50° W. No. XXVII.—This area appeared in central Texas on the 23d, resulting in part from the division of the elongated depression of 29.80 which marked the peculiar of area No. XXIV on this day. The division of this depression by the descent of a high pressure area as heretofore noted in the description of area No. XXIV was instrumental in the rapid movement northeastward of area No. XXVII, which by morning of the 24th was central over the Lower Lakes, accompanied by heavy precipitation. During the day it moved down the valley of the St. Lawrence, being central on the morning of the 25th over Newfoundland, thereafter combining with area No. XXIX, which had approached northeastward from the northern portion of the Middle Atlantic states. No. XXIX.—This area appeared over southern New England on the 24th, while area No. XXVII was central in the Lower Lake region. During the day it moved rapidly northeastward to Newfoundland, where it was central morning of the 25th. St. Pierre, N. F., 29.49, a fall of 0.71 inch, wind shifted from NW. to SW.; St. John's, N. F., 29.56, a fall of 0.46 inch, wind shifted from NW. to S., with rain. During the day the depression passed eastward to about 50° N., 40° W., where it was central on the 26th; in 40° 45' N., 38° 20' W., 29.43, NW., force 5, drizzling; in 41° 40' N., 54° 10' W., NNE., force 4 rain; in 51° 26' N., 36° 42' W., 28.81, a fall of 0.72 inch, WSW., force 10, very heavy sea, cloudy; 49° 04' N., 42° W., strong westerly gales throughout the day; in 49° 32' N., 36° 58' W., very heavy west gales with dangerous sea; in 47° 39' N., 35° 47' W., W. to NW. strong gale, high sea; in 48° 13' N., 33° 47' W., WNW. gale, high sea, heavy rain and violent squalls. As the depression passed northeastward to Iceland, very heavy W. to NW. gales, with snow squalls, prevailed over the ocean between 45° and 60° N., and 25° and 45° W. 27th, depression central over Iceland, with greatly increased energy, and very sharp barometric gradients southward to the British isles. The area of 29.60 extended from 50° N., 40° W. northeastward to Norway, covering the northern portion of the British isles. Over the latter the southerly winds had increased to gales, with velocities ranging from 25 to 60 miles per hour, and accompanied by fierce squalls of rain and snow; the barometer fell from 0.25 to 0.60 inch in past 24 hours. The following observations were reported from Stykkisholm: 24th, 29.50, NE., force 6; 25th, 29.31, SE., force 8, rain; 26th, 29.00, SW., force 6, snow squalls; 27th, 29.98, calm, the lowest barometer reading of the month, and also for a period many years, at this station; 28th, 28.62, NE. force 7, snow squalls; 29th, 29.08, E., force 8. In 47° 06' N., 45° 50' W., strong WNW. gale throughout day, with thick snow squalls and hard frosts at night; in 48° 24' N., 41° 27' W., heavy westerly gale and high sea; in 57° N., 19° W., hurricane from SW. to NW., with frightful sea; S. S. *Silesia*, from Hamburg to New York, when about 600 miles west of Queenstown, experienced tremendous hurricane from 27th to 31st; in 50° 54' N., 26° 23' W., SW. to WNW. moderate gale, high sea; in 51° 22' N., 20° 30' W., SW. and W. strong gales, hard squalls. 28th, depression central

north-northeast of the Faroe islands; Thorshavn, 29.04, W., force 6; North Unst, 29.23 W., force 8; Sandwick Manse, 29.42, SW., 24 miles, rain; Valencia, 29.71, SSW., 52 miles, rain; Brono, 28.98 a fall of 1.02 inches, SW., rain and snow; Tromso, 28.93, a fall of 0.89 inch, SW., fair; Christiania, 29.46, a fall of 0.98 inch, S., cloudy; Hernosand, 29.44, a fall of 0.93 inch, S., cloudy. The area of precipitation extended southward from parallel 70° N. to parallel 45° N. and between the meridians of 30° E. and 10° W. As the depression passed eastward the pressure rose slightly over the Faroe islands with winds shifting to NW., but over the Shetland and Orkney islands it fell considerably with steady westerly winds. 29th, depression central in northern Scandinavia: Brono, 28.74, S., snow; Tromso, 28.73, SW., cloudy; Christiania, 29.06, WSW., threatening; Bergen, 29.35, WSW., 1.17 inches rain-fall in past 24 hours. The lowest pressures on this day were reported from northern Sweden: Hernosand, 28.69, calm, cloudy; Umea, 28.80, S., cloudy; Upsala, 28.80, SW., cloudy; Stockholm, 28.95, NW., cloudy; Haparanda, 29.06, SE., cloudy. The area of precipitation now moved eastward into central Russia, with winds shifting to south and southeast. During the day the depression moved slowly northward with diminished energy. The further progress of the area eastward was prevented by the exceedingly high pressures over central Siberia (30.80) and western Russia (30.40.) 30th, Tromso, 28.77, a rise of 0.04 inch, SW.; Brono, 28.88, a rise of 0.14 inch, SW., rain and snow; Haparanda, 28.98, a fall of 0.08 inch, calm; Umea, 29.03, a rise of 0.23 inch, SW., cloudy; Hernosand, 29.06, a rise of 0.37 inch, SW., clear; Archangel, 29.41, a fall of 0.26 inch, ESE., cloudy. 31st, central with greatly diminished energy over northern Lapland; Tromso, 28.91, SW., fair; Haparanda, 29.13, SSE., fair; Archangel, 29.52, ESE., cloudy. During the day the depression gradually filled up in the vicinity of parallel 70° N. This storm proved to be the most violent of the month and was accompanied by the lowest barometric readings. No. XXX.—For four days previous to the appearance of this depression the barometer had been high in the Northwest and Saskatchewan valley, ranging from 30.20 to 30.80, but by morning of the 26th, a small area of 29.80 appeared in northern Dakota, accompanied by southerly winds and occasional light rains. 27th, central in the Upper Missouri valley, with heavy gales to the south and west: Pike's Peak, SW., 56; Dodge City, SW., 45; Cheyenne, W., 44 miles. 28th, central in the Lower Missouri valley, Leavenworth barometer 0.70 inch below the normal. During the day the depression moved rapidly northeastward in a narrow barometric trough over the Upper Mississippi valley to the Lower Lakes, where it was central morning of the 29th. During the day it moved rapidly northeastward down the St. Lawrence valley, being central on the morning of the 30th, northeast of Newfoundland. 30th, in 49° 35' N., 46° 20' W., 29.39, a fall of 0.90 inch, SW., heavy gales with rain; in 47° 50' N., 48° 30' W., 29.66, a fall of 0.64 inch, SW., heavy gales, threatening. During the day the depression passed rapidly northeastward south of Iceland, and on the morning of the 31st was central just west of the Faroe islands with a barometric trough of 29.00 extending southwestward from northwestern Norway over Iceland to near 50° N., 40° W. The following observations were reported from Stykkisholm, Iceland, during the approach and passage of the storm: 19th, 29.08, E., force 8; 30th, 28.90, E., force 6; 31st, 28.86, E., force 2; January 1st, 28.39, NE., force 6, snow; 2nd, 29.21, N., force 8 snow. It will be observed at the commencement of these observations that the pressure at Stykkisholm had recovered from the extraordinary influence of area No. XXIX. Thorshavn, 29th, 29.15, NW., force 2; 30th, 28.95, SE., force 6; 31st, 29.09, SW., force 2; January 1st, 28.64, S., force 6, rain. North Unst, 29th, 29.07, W., force 7; 30th, 29.17, SE., force 6; 31st, 29.19, W., force 7. The further course of this depression will appear on the January chart, 1880. No. XXXI.—This depression of slight energy first appeared in the Northern Plateau district on the 28th, while area No. XXX was central in the Lower Missouri valley. 29th, central in the Middle Plateau, lowest pressure at Salt Lake City, 29.77, calm, light snow. southerly winds with light rain prevailed in western Arizona and northerly winds with light snow in Colorado and Wyoming. By morning of the 30th the depression had disappeared in an area of high pressure, 30.20, over New Mexico, which increased to 30.40 to the east and northeast. No. XXXII.—This area appeared morning of the 30th in the Saskatchewan valley and during the day moved thence southeastward to Lake Superior being central to the northward on the 31st. The depression as yet displayed but slight energy owing probably to the very high pressures to the south and east, 30.40, in the Middle slope and Lower Missouri valley, and 30.70 in the Middle Atlantic states, New England and Lower St. Lawrence valley. The further course of this area will appear on the January chart, 1880. No. XXXIV.—This area advanced from the Pacific ocean in parallel 50° N., and was central over British Columbia on the 31st. Its further course will probably appear on the January chart, 1880. Of the storms forming over the Atlantic ocean but one has been traced for the present month, concerning which the following brief description is given: No. III.—This area apparently resulted from a slight depression which on the 29th and 30th of November occupied the ocean south of parallel 40° N., and between the meridians of 30° and 50° W.; On December 1st, the barometer at Angra, read 29.50, a fall of 0.38 inch, wind shifted from E. to W., 0.80 inches rainfall in past 24 hours; Ponta Delgado, 29.57, a fall of 0.49 inch, wind shifted from ESE. to SW., 1.60 inches rainfall in past 24 hours. 2d, depression central in about 45° N., 15° W., thereafter pursuing a southeasterly course to the northwestern coast of Spain where, on the morning of the 3rd, it was central with greatly increased

energy. On this day the lowest barometer reported occurred at Santiago, 28.81, a fall of 1.24 inches in past 48 hours or of 0.84 inch in past 24 hours, wind SSW., stormy; 1.23 inches rainfall in past 24 hours. Lisbon, 29.20, a fall of 0.52 inch, SW., 40 miles, 0.70 inch rainfall in past 24 hours. Pressure over Spain fell generally from 0.20 to 0.80 inch. During the day the depression curved to the northeast with slowly diminishing energy; being central morning of the 4th, on the western coast of France; Tours, 29.08, a fall of 0.57 inch, E., stormy; Rochefort, 29.06, a fall of 0.41 inch, S., cloudy; Bourges, 29.09, a fall of 0.65 inch, SSE., cloudy; Lorient, 29.00, a fall of 0.48 inch, NE., force 8, cloudy. On this day ten stations in France reported snow with northeasterly winds; the winds throughout that country were generally from NE. to SE., with the barometer ranging from 29.00 to 29.60. During the day the depression moved rapidly eastward along parallel 50° N. and by morning of the 5th was central in southern Germany; lowest barometer at Leipsic, 29.31, a fall of 0.45 inch, ENE., heavy snow. Violent northeast to southeast and westerly gales with snow prevailed throughout Germany. Southeast to southwest and northwest winds with rain prevailed throughout Austria and Hungary. 6th, depression central north of the Black Sea; Lugan, 29.35, a fall of 0.19 inch, ESE., cloudy; Nikolaiev, 29.56, N., cloudy; Kieff, 29.58, NE., cloudy. 7th, gradually disappeared in a high pressure area over the Caspian sea. Concerning the storms in Europe the following descriptions are given: No. IV.—This area is traced as a continuation of No. XXIV of the November chart. Central morning of the 1st in Hungary; lowest barometer at Pola, 29.30, E., force 6, rain; snow was reported, with northeasterly winds, from Szathmar and Trieste, and with a west wind from Agram. On this day a narrow barometric trough, of 29.50, extended from the eastern extremity of the Black sea westward to include northern Italy. 2d, depression central north of the Black sea; Lugan, 29.43, SSW., cloudy; Nikolaiev, 29.30, SW. rain; Kieff, 29.34, NE. snow. During the day the depression passed rapidly northeastward, and on the morning of the 3d was central in about 55° N., 55° E.; Kasan, 29.14, a fall of 0.87 inch, SW. cloudy; Krotkovo, 29.33, a fall of 0.60 inch, SW., cloudy; Ekaterinburg, 29.90, a rise of 0.18 inch, SSE., snow; Archangel, 29.66, a fall of 0.40 inch, NE. cloudy. 4th, depression central east of the White sea; Archangel, 29.14, NE., snow; Kasan, 29.73, SSW., fair; Ekaterinburg, 29.35, WSW., fair; 5th, depression about stationary; Archangel, 29.58, N., fair; Kasan, 29.73, S., fair; Ekaterinburg, 29.87, SW., fair. During the 6th and 7th the depression passed slowly eastward to the valley of the Yenisei; on the 6th there was a fall of 0.41 inch at Barnaul and on the 7th of 0.65 inch at Yeniseisk, wind SE., snow; wind shifted to SW., with snow at Barnaul. 8th, depression probably disappeared in an area of high pressure (30.30) over southern Siberia. No. V.—This depression is a continuation of area No. XXVII of the November chart. Central on the 1st in the valley of the Obi, it was accompanied by easterly winds and snow. 2nd, central in the valley of the Yenisei, with rapidly diminishing energy and during the day disappeared in an area of 30.30 in central Siberia. No. XIII.—This depression formed over Lapland on the 13th as the result of an elongated area of barometric minima extending from southern Greenland northeastward to northern Scandinavia, accompanying the advancement of area No. IX then central west of Iceland. 13th, Tromso, 29.48, a fall of 0.42 inch, SW., cloudy, 1.10 inches rainfall in past 24 hours; Haparanda, 29.50, a fall of 0.78 inch, SE., cloudy; Archangel, 29.43, a fall of 0.92 inch, SSW., heavy snow drift. 14th, depression central in about 60° N., 60° E.; Archangel, 29.70, WNW., cloudy; Kasan, 29.88, a fall of 0.50 inch, WSW., snow; Ekaterinburg, 29.55, a fall of 0.82 inch, SW., cloudy. 15th, central in about 60° N., 80° E.; Ekaterinburg, 29.86, W., fair; Barnaul, 29.69, fall of a 0.15 inch, NW., snow; Yeniseisk, 29.86, a fall of 0.37 inch, clear. By morning of the 16th the depression had lost its identity owing to the rapid advance and superior energy of area No. IX, then central near the White sea. On this day the barometer rose rapidly to 30.10 at Yeniseisk and 30.21 at Barnaul. No. XVII.—This depression appeared on the 17th over the White sea as an auxiliary area to No. IX then central in the valley of the Obi. On that day a narrow barometric trough of 29.00 ran southeastward from Lapland, inclosing the centre of area No. XVII, while the isobar of 29.40 inclosed that of area No. IX. 17th, Archangel, 29.88, a fall of 0.36 inch, SW., cloudy. 18th, depression central in about 60° N., 60° E.; Archangel, 29.57, NW., fair; Kasan, 29.25, a fall of 0.46 inch, NW., fair; Ekaterinburg, 29.16, a fall of 0.18 inch, SW., cloudy. 19th, central in the valley of the Obi, with diminishing energy; Ekaterinburg, 29.51, W., fair. 20th and 21st, depression about stationary but with decreasing pressure, finally disappearing east of the Yenisei on the 22d. This depression probably reached the Asiatic coast, as the pressure on the following day was below 29.70 eastward to Nikolaievsk on the Amoor. No. XXVI.—This depression of slight energy appeared north of the Caspian sea on the 22nd; Krotkovo, 29.80, N., light snow; Kasan, 29.82, NNW., cloudy; Ekaterinburg, 29.63, calm, cloudy. 23rd, central in about 55° N., 75° E.; Ekaterinburg, 29.91, NW., clear; Barnaul, 29.69, a fall of 0.25 inch, SE., snow; Tashkend, 29.94, a fall of 0.12 inch, winds shifted from N. to W. 24th, passed eastward south of Yeniseisk, barometer 29.70, a fall of 0.17 inch, W., cloudy; Barnaul, 29.82, a rise of 0.13 inch, SW., cloudy. By morning of the 25th had disappeared in an area of 30.30, over southern Siberia. Concerning the storms off the Asiatic coast, the following descriptions are given. No. VII.—This depression first appeared south of the Island of Formosa and moved thence northeastward, being central on the 6th near the Island of Kinsin; Nagasaki, 29.88, a fall of 0.14 inch, wind shifted from N. to S., with heavy rain; in 28°

27° N., 127° 18' E., 30.08, NNW., heavy gale, high sea; Hiroshima, 29.76, a fall of 0.28 inch, wind shifted from NNE to SW., gloomy weather; Tokei, 29.87 a fall of 0.29 inch, wind shifted from NNE. to NNW., cloudy, 0.88 inch rainfall in past 24 hours; Wakayama, 29.73, a fall of 0.29 inch, wind shifted from NE. to SE. 7th, depression probably central off the northeastern coast of the Island of Nippon; lowest barometer at Tokei, 29.60, a fall of 0.27 inch, SW., clear; Yokohama, 29.65, a fall of 0.27 inch, W., clear; Wakayama, 29.84, W., clear; Hiroshima, 29.88, W., rain; Nagasaki, 30.10, W., rain. During the day the depression disappeared to the eastward over the ocean, followed morning of the 8th by clear weather and rising pressure at all stations. No. XV.—On the 14th the barometer at Nagasaki fell from 0.15 to 0.20 inch, followed on the morning of the 15th by winds shifting from W. to NW., with heavy rain. The pressure at most Japanese stations had fallen from 0.10 to 0.15 inch, with northeasterly winds. 16th, depression probably central off the southeastern coast of Nippon; Tokei, 29.72, a fall of 0.37 inch, NW., rain, 1.73 inches rainfall in past 24 hours; at other Japanese stations the barometer rose from 0.01 to 0.23 inch, with clearing weather and winds shifting to northwesterly. This depression was too far south of the coast to produce decided effect at land stations. No. XXII.—On the 18th, the barometer at all Japanese stations fell from 0.06 to 0.21 inch, followed on the 19th by winds shifting to easterly, with cloudy weather and rain. By morning of the 20th the depression passed eastward south of Tokei, the barometer at that station having fallen 0.24 inch, wind shifting from NE. to NNW., with clearing weather. The barometer at other stations, except Wakayama, rose from 0.07 to 0.11 inch, with winds shifting to northeasterly. No. XXIII.—The presence of this depression to the southwestward was forestalled on the 20th at western stations by the shifting of the winds from northwest to northeast, with slowly rising pressure, while at Wakayama, Yokohama and Tokei (eastern stations) the winds shifted from northeast to northwest, with falling pressure under the influence of departing area No. XXII. By morning of the 21st the barometer at all Japanese stations had fallen from 0.02 to 0.12 inch, with northeast to northwest winds and light rain at Nagasaki. 22nd, lowest barometer at Tokei, 29.69, a fall of but 0.01 inch, NNW., clear. Nagasaki remained stationary, while the barometer at other stations fell from 0.03 to 0.04 inch; the winds at all stations shifted to northerly, with clear or fair weather. By morning of the 23d the barometer at all stations, except Nagasaki, had risen from 0.04 to 0.10 inch, with winds shifting to northwesterly; the probable position of the area was indicated by the following ships report: in 37° 10' N., 161° 32' E., 29.54, NW., force 4 to 6, high westerly gales, heavy sea and rain. This depression was too far south to produce decided effect at land stations. No. XXVIII.—The position of this depression as charted on the 23d is very much in doubt, although the southeasterly winds, with falling pressure at Manilla would probably indicate its presence south of the Island of Formosa. By morning of the 24th the barometer at Nagasaki had fallen slightly, wind changed from WNW. to calm. At Hiroshima the barometer fell 0.02 inch, wind NNE., clear; Tokei, rose 0.04 inch, wind shifted from NNW. to NE.; Wakayama, rose 0.01 inch, wind continued from the E. 25th, Hiroshima, barometer stationary, wind shifted from NNE. to NNW, light rain; Nagasaki, rose 0.08 inch, wind N.; Tokei, 29.55, a fall of 0.38 inch, wind shifted from NE. to SSW.; Wakayama, fell 0.16 inch, wind shifted from E. to NNW, light rain. By morning of the 26th, the barometer at Japanese stations had risen from 0.15 to 0.53 inch, winds shifting to northeasterly, with clear or fair weather. On this day the depression was probably central in about 37° N., 150° E., as shown by the following ship's report: in 35° 50' N., 150° 24' E., 29.35, SSW., force 7, high southwesterly sea, heavy rain. This vessel, on the 25th, in 36° 10' N., 154° 57' E., reported a barometer of 30.08, wind SW., force 4; in moving east about 4° she experienced a fall in pressure 0.73 inch, with wind increasing to a gale. The probable position of the depression on the 27th is again indicated by the ship's report as follows: in 35° 48' N., 148° 09' E., 29.48, N., force 9, high north sea, heavy rain. 28th, in 25° 22' N., 145° 55' E., 29.85, N., force 6, high NNW. sea, heavy rain. No. XXXIII.—By morning of the 28th the barometer at Nagasaki had fallen from 30.09 to 29.86, wind shifted from SE. to WNW., with light rain. At Hiroshima the barometer had fallen 0.43 inch, wind shifted from NNE. to ESE., with rain; Tokei, fell 0.23 inch, wind shifted from ESE. to NNE., with moderately heavy rain; Wakayama, fell 0.48 inch, wind shifted from NNW. to E., with moderately heavy rain. 29th, Tokei, 29.34, a fall of 0.65 inch, SSE., cloudy; Wakayama, 29.56, a fall of 0.16 inch, NW., fair; Hiroshima, 29.73, a fall of 0.03 inch, W., cloudy; Nagasaki, 29.97, a rise of 0.11 inch, NW., cloudy; in 34° 53' N., 142° 55' E., 29.41, SSW., force 6, high west sea, cloudy. 30th, Tokei, 29.32, a fall of 0.02 inch, SW., clear; Wakayama, 29.67, a rise of 0.11 inch, WNW., cloudy; Hiroshima, 29.81, a rise of 0.08 inch, WNW., cloudy; Nagasaki, 29.98, a rise of 0.01 inch, WNW., rain; in 35° 02' N., 140° 42' E., 29.30, WNW., force 6, high west sea, rain squalls. 31st, the barometer at all Japanese stations rose from 0.11 to 0.24 inch, winds shifted from SW. and WNW. to N. and NNE., with clear or partly cloudy weather; lowest barometer at Yokohama, 29.42, rising on the following day to 29.90, wind W. During the day the depression disappeared to the eastward over the ocean.

TEMPERATURE OF THE AIR.

The mean temperature of the air for November, 1881, is shown by the isothermal lines (in red) on chart No. II. The table of mean and comparative temperatures in the right hand corner of the chart shows, in the first column, the average for the month through-